

CLAIMS

I claim:

1. A downstream wind turbine for converting wind energy into electrical energy, comprising:

a generally vertical support tower;

a yaw bearing attached to the support tower;

a support frame having a top and a bottom, wherein the bottom of the support frame is operably linked to the yaw bearing such that the support frame is free to yaw about a horizontal axis;

at least one swing arm having first and second opposite ends, the first opposite end is pivotally attached to the top of the support frame, wherein the at least one swing arm is free to swing at an angle perpendicular to the support frame;

an elongated carry member pivotally attached to the second opposite end of the at least one swing arm, wherein the carry member is at least partly accommodated inside the support frame and is orientated at a perpendicular angle with respect to the support frame; and

a wind driven energy conversion system for generating electricity from wind, the energy conversion system comprising an electric generator, a power shaft, a transmission system and a rotor head attached to at least two blades, wherein the energy conversion system is balanced on and firmly attached to the carry member so that the carry member is biased to maintain an approximately horizontal orientation with respect to the support frame and in response to wind incident on the blades proportionally swings downstream from the support frame.

2. The downstream wind turbine of claim 1 further comprising:

a governor device for modifying at least one dynamic characteristic of the downstream wind turbine; and

a means for measuring the amount of downstream swing experienced by the carry member and simultaneously or nearly simultaneously transmitting this information to the governor device for modifying at least one dynamic characteristic of the downstream wind turbine.

3. The downstream wind turbine of claim 2, wherein the governor device is selected from the group consisting of: a blade pitch regulator, a braking device, a blade tip pitch control device.

4. The downstream wind turbine of claim 2, wherein the governor device is a blade pitch regulator.

5. The downstream wind turbine of claim 2, wherein the carry member comprises a curved glide in operable contact with a roller.

6. The downstream wind turbine of claim 2, wherein the carry member comprises a curved glide in operable contact with a roller, and a stop in the form of an extension of the bottom of the carry member to prevent over-tilting of the carry member.

7. A downstream wind turbine for converting wind energy into electrical energy, comprising:

- a generally vertical support tower;

- a yaw bearing attached to the support tower;

- a support frame having a top and a bottom, wherein the bottom of the support frame is operably linked to the yaw bearing such that the support frame is free to yaw about a horizontal axis;

- at least one swing arm having first and second opposite ends, the first opposite end is pivotally attached to the top of the support frame, wherein the at least one swing arm is free to swing at an angle perpendicular to the support frame;

- an elongated carry member pivotally attached to the second opposite end of the at least one swing arm, wherein the carry member is at least partly accommodated inside the support frame and is orientated at a perpendicular angle with respect to the support frame;

- a wind driven energy conversion system for generating electricity from wind, the energy conversion system comprising an electric generator, a power shaft, a transmission system and a rotor head attached to at least two blades, wherein the energy conversion system is balanced on and firmly attached to the carry member so that the carry member is biased to maintain an approximately horizontal orientation with respect to the support frame and in response to wind incident on the blades proportionally swings downstream from the support frame;

- a governor device for modifying at least one dynamic characteristic of the downstream wind turbine; and

a means for measuring the amount of downstream swing experienced by the carry member and simultaneously or nearly simultaneously transmitting this information to the governor device for modifying at least one dynamic characteristic of the downstream wind turbine.

8. The downstream wind turbine of claim 7, wherein the governor device is selected from the group consisting of: a blade pitch regulator, a braking device, and a blade tip pitch control device.

9. The downstream wind turbine of claim 7, wherein the governor device is a blade pitch regulator.

10. The downstream wind turbine of claim 7, wherein the carry member comprises a curved glide in operable contact with a roller.

11. The downstream wind turbine of claim 7, wherein the carry member comprises a curved glide in operable contact with a roller, and a stop in the form of an extension of the bottom of the carry member to prevent over-tilting of the carry member.

12. A downstream wind turbine for converting wind energy into electrical energy, comprising:

- a generally vertical support tower;

- a yaw bearing attached to the support tower;

- a support frame having a top and a bottom, wherein the bottom of the support frame is operably linked to the yaw bearing such that the support frame is free to yaw about a horizontal axis;

- at least one swing arm having first and second opposite ends, the first opposite end is pivotally attached to the top of the support frame, wherein the at least one swing arm is free to swing at an angle perpendicular to the support frame;

- an elongated carry member pivotally attached to the second opposite end of the at least one swing arm, wherein the carry member is at least partly accommodated inside the support frame and is orientated at a perpendicular angle with respect to the support frame;

- a wind driven energy conversion system for generating electricity from wind, the energy conversion system comprising an electric generator, a power shaft, a transmission system and a rotor head attached to at least two blades, wherein the energy conversion system is balanced on and firmly attached to the carry member so that the carry member is biased to maintain an approximately horizontal orientation with respect to the support frame, wherein the elongated carry member is biased to return to an approximately horizontal orientation when acted upon by gyroscopic precession forces;

- a governor device for modifying at least one dynamic characteristic of the downstream wind turbine; and

a means for measuring the amount of downstream swing experienced by the carry member and simultaneously or nearly simultaneously transmitting this information to the governor device for modifying at least one dynamic characteristic of the downstream wind turbine;

whereby the carry frame is free to tilt up or down in response to gyroscopic precession forces and further whereby in response to wind incident on the blades the carry member proportionally swings downstream from the support frame.

13. The downstream wind turbine of claim 12, wherein the governor device is selected from the group consisting of: a blade pitch regulator, a braking device, and a blade tip pitch control device.

14. The downstream wind turbine of claim 12, wherein the governor device is a blade pitch regulator.

15. The downstream wind turbine of claim 12, wherein the carry member comprises a curved glide in operable contact with a roller.

16. The downstream wind turbine of claim 12, wherein the carry member comprises a curved glide in operable contact with a roller, and a stop in the form of an extension of the bottom of the carry member to prevent over-tilting of the carry member.